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## **Natural Hazards: Changing Media Environments and the Efficient Use of ICT for Disaster Communication**

Zemp, H

**Abstract:** The growing importance of mass media in the 'information society', combined with society's increased dependence on electronic modes of information is important to the perception, regulation and management of risk at a local, national and international level. However, media organisations have their own logic and goals that are not necessarily compatible with the logic and goals of disaster planning and assistance agencies. Using a detailed study of the media coverage of floods in Switzerland from 1910 to 2005, we will illustrate the salient features of disaster reporting and how these relate to issues of risk perception and risk prevention behaviour in the public sphere. The findings are used to discuss the traditional media's shortcomings for the goal of risk reduction, the public's information seeking behaviour, and the opportunities and limitations arising from the emergence of digital, internet-based information and communication technologies (ICT) for disaster communication.

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# Advanced ICTs for Disaster Management and Threat Detection: Collaborative and Distributed Frameworks

Eleana Asimakopoulou  
*Loughborough University, UK*

Nik Bessis  
*University of Bedfordshire, UK*

Information Science  
**REFERENCE**

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# Chapter 4

## Natural Hazards: Changing Media Environments and the Efficient Use of ICT for Disaster Communication

Helena Zemp  
University Zurich, Switzerland

### ABSTRACT

*The growing importance of mass media in the ‘information society’, combined with society’s increased dependence on electronic modes of information is important to the perception, regulation and management of risk at a local, national and international level. However, media organisations have their own logic and goals that are not necessarily compatible with the logic and goals of disaster planning and assistance agencies. Using a detailed study of the media coverage of floods in Switzerland from 1910 to 2005, we will illustrate the salient features of disaster reporting and how these relate to issues of risk perception and risk prevention behaviour in the public sphere. The findings are used to discuss the traditional media’s shortcomings for the goal of risk reduction, the public’s information seeking behaviour, and the opportunities and limitations arising from the emergence of digital, internet-based information and communication technologies (ICT) for disaster communication.*

### INTRODUCTION

When people are under threat, perceived or actual, information seeking is intensified. In such circumstances the national mass media system has a major responsibility to disseminate news, as well as public perceptions of disasters. Optimal preventative strategies for reducing damage require planned interactions with the media. As

a system and process, risk communication does not take place in a vacuum. Communication is shaped by a variety of contingent and historical factors, including politics, media and culture (Renn, 1992; Dunwoody, 1992). Optimal disaster communication needs to fine-tune all activities related to disaster planning and relief with the logic of traditional and new media. Effective communication needs to be based on profound knowledge of media systems. Not understanding media channels and the public’s use of them can

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worsen crisis and disaster situations (Zemp & Bonfadelli, 2008).

We will argue that communication strategies that are not aligned with the potential victim's behaviour have a limited opportunity to raise the level of risk awareness. By producing a comprehensive map of the basic structures of disaster coverage deployed by traditional mass media we can identify which areas of the disaster process are covered and which topics are relatively neglected or ignored.

Findings on the changing logic of news production, its consequences for disaster reporting, as well as the public's information seeking behaviour and its perception of risk, will enable us to identify lessons for the use of new information and communication technologies (ICT) for risk communication. Evidently, these developments provide low-threshold access to worldwide information, communication and publication. We conclude with suggestions for the successful adaptation of risk communication in an increasingly commercialised environment and the role of web-based information channels.

## **BACKGROUND**

### **The Function and Changing Logic of the Media**

The core function of the media is not simply to transfer information or to report what has happened and what is being done. Rather, the media is a dynamic interpreter that analyses events and even prescribes what should be done (Peters, 2009). The mass media operates as a critic in democracies, where scrutinizing public officials' performances is a well-accepted practice, along with institutions to judge, punish, compensate and protect the general public. In other words, the publication of information and criticism perceived to be of public interest is understood as one of

the primary roles of mass media in democratic societies (McQuail, 2005).

In this process, the media also select the events and issues to be reported. Journalists can choose among many sources for their reports. Official and expert sources hold powerful positions, sometimes as the sole authority figures, serving to reassure or warn the public, or feeding into an ongoing debate. However, additional views may be sought to counteract or amplify the expert sources (Reese, Grani & Danielan, 1994; Boykoff & Rajan, 2007; Peters, 2009). The interplaying factors of internal norms for editors and journalists, personal judgments in news selection, and organisational and ideological pressures, all lead to the framing of the discourse in important ways. This is inevitable as media practitioners attempt to make sense of our world, which leads to the emphasis on some aspects of the world reality and the relative disregard of others. These "patterns of presentations, of selection, emphasis, and exclusion" are known as framing (Gitlin, 1980, p. 7; Entman, 1993).

Over the last decades, there have been tremendous structural changes in the media system. In most of the developed world there is a history of state-related telecommunications and broadcasting supplemented by party-political and commercial press. The relationship between the political system and media has been weakened and was gradually replaced by an independent media system. In the 1980s and 1990s government monopolies in broadcasting and telecommunications were broken up. With the increasing competition amongst media organisation for attention in the public sphere comes a trend towards commercialisation. Media organisations must package their stories in an increasingly competitive and unprecedented 24/7 real time context (Cottle, 2009). Most importantly, media and journalistic activities that decide what is and what is not newsworthy is increasingly dependent on audience ratings and sales figures. News values for instance, unexpectedness, negativity, dread, personalisation or good visuals, are often regarded as factors that

contribute to the newsworthiness of a potential story (Galtung & Ruge, 1965; Schulz, 1990; Ruhrmann & Göbbel, 2007). Due to these changes the coverage shifts from public service orientated information towards more entertainment-oriented content. Even the so-called quality press concentrates more on sensational human interest stories; broadsheet front pages mimic those of the tabloid press using more and bigger pictures, larger print and shorter sentences. This trend is referred to as tabloidization (Holly, 2008). A second but intertwined trend is established through the emergence of new communication channels at the end of the 20th century. Based on digital technology the internet has become increasingly important. This affects journalistic research practices and growing online activities of traditional media organisations. Media are increasingly catering to a mobile consumer and new competitors have arisen (Chaudhary, 2004). Additionally, the new technical opportunities foster the development of globalised news distribution and media ownership. These changes in structure have led to more individualised and commercialised communication. Literature suggests that these developments also weaken of public service oriented goals of media reporting (McManus, 1994; McQuail, 1998; Picard, 2005). In summary, there have been two different developments that have jointly changed the media ecology during the last decades: (1) a long-term trend towards commercialisation, and (2) the emergence of new media based on digital technology (Geser, 1997).

Additionally, the audience and its usage of the media have to be considered. It is important to note that the audience is not a passive and homogeneous receiver of information. Members of the audience have individual characteristics, varying information needs and different information seeking behaviour. These parameters are important mediating factors of media effects (Seeger, 2008). The uses-and-gratifications perspective suggests that the audiences' media choices and usage – whether for instrumental or

ritualised reasons – are characterised by the following features: (1) Socio-psychological needs, which generate (2) expectations of (3) the mass media and other sources, therefore leading to (4) differentiated patterns of media exposure, resulting in other consequences, perhaps mostly unintended. This approach – first theorised by Katz (1974) – shifts the emphasis in communication science to the question, “What do people do with media?”, and away from the former paradigm of assumed effects, “What does media do to people?” (Blumer & Katz, 1974). The audience is weaving together mediated knowledge, institutionally acquired knowledge, along with the information and evaluation resources grounded in personal experiences and local knowledge, in order to make sense of a situation. Acknowledging this active process means there are substantial variations in both the interpretation of and reaction to specific media content (Bonfadelli, 2001). This shifting interplay between information sources constrains and limits understanding. The active audience perspective examines the audience's choices to satisfy information needs alongside different conceptions of new media phenomenon such as internet, cell phones, interactive cable television, etc., in contrast to and competing with traditional media, in particular radio, broadcast television and newspapers.

## **DISASTER MANAGEMENT AND THE ROLE OF COMMUNICATION**

Managing disasters is an integrated and multilayered process. Generally speaking, the functions of disaster management include: (1) Clarifying risk and encouraging preparedness; (2) Issuing evacuation and warning; (3) Enhancing coordination, cooperation, and logistics; (4) Facilitating mitigation on the part of the public and affected communication; (5) Helping make sense of the disaster; (6) Reassuring, comforting, and consoling those affected; (7) Recreating order and meaning,

facilitating renewal, and learning and disseminating lessons (Auf der Heide, 2009; Seeger, 2005). Indisputably the quality of communication plays a central role for the fulfilment of the listed functions and thereby influences the vulnerability and resilience of the society.

For the threatened population and individuals, disaster communication – encompassing both direct and mediated forms – is crucial for developing realistic perceptions of risk. In addition, communication can motivate people to prepare for a disaster and enable them to take appropriate actions during the event and for recovery in the aftermath. As a non-routine situation, accurate information is extremely important. Disaster communication can be vital to survival in the face of uncertainties that require interpretation, explanation and consolation. Problems in the communication process between disaster agencies and the public can spread dysfunctional dynamics with destructive consequences (Comfort, Dunn, Johnson, Skertich & Zagorecki, 2004).

For the overall goal of risk reduction, it is useful to divide the communication strategies into three phases:

1. Public awareness (pre-event)
2. Public warning (during the event)
3. Informing and advising the public (immediately following and long-term post-event)

In all three phases the media is extremely important to the communication strategies of disaster agencies as media channels (newspapers, television, radio and – increasingly internet or cell phones) provide easy access to a large public. Before a crisis the media raises the public awareness through reporting on existing risks. During a crisis the media distributes warnings and release specific information on protective measures that need to be taken by the public. In the aftermath media communication disseminates information into the public sphere, which stimulates public debate that may then be used to inform and create

a policy agenda for future planning (Seeger, 2008; Auf der Heide, 2009). Through all phases the level of coverage, exposure, placement, headlines and photographs, contribute to the way in which events and risks are construed by the public in the immediate and the long term (Ashlin & Ladle, 2007).

Policy-makers and disaster agencies acknowledge the increasingly powerful role of the mass media in the process of disaster communication. But the liaison with journalists is not a straightforward exercise and institutions often face difficulties in working with the media. Disaster agencies and media organisations have different and sometimes even conflicting, goals. While agencies must assure public safety through their communication, media organisations want to attract readers, viewers or listeners. From the disaster management point of view, what they expect from the media – especially under extreme urgency – and what they get, may support but can also obstruct the goals of disaster authorities and relief organisations (Peters, 2009). A good understanding of the disparate requirements and the organisations involved in the process of communication is of critical importance for effective disaster communication.

### **Disaster Communication in a Changing Media Environment**

The non-routine nature of disasters or crisis increases the importance of information for the public. The role of disaster agencies is to provide the needed information through different channels. At the same time disasters have everything it takes to gain attention in a commercialised media environment as they are characterised by news values such as unexpectedness, negativity and dread. These circumstances should provide a good basis to transmit important information and achieve the overall goal of risk reduction for the public. However, as described earlier, the changing logic of the media and the evolution of new communication technologies complicate the flow



of information, requiring a thorough analysis of the relationship between disaster agencies, media and the public. There are two issues that deserve special attention: (1) journalistic routines and their impact on disaster reporting, and (2) the public information seeking behaviour and interests.

Concerning the first issue, the effects of the changing media ecology on disaster communication and media content, we have already pointed out that operational rules differ among the media and disaster agencies, with the former more concerned with business than public communication of the type desired by the latter (Nudel & Antokol, 1988; Peters, 2009; Auf der Heide, 2009 Chapter 10). In times of increasing commercialisation where the media and journalists face fierce economic and personal competition this gap can become even larger. There is tremendous pressure on journalists, particularly in the immediate aftermath of a disaster, to bring a story that will interest but also inform the consumer at the least cost (Berington & Jemphrey, 2003). As real world events and information disseminated by the agencies interact with journalistic norms and business practices the original messages that agencies wish to convey may differ considerably from media output. The demands created by varying levels of crisis management to inform and successfully communicate will often be hindered by news production conditions. For example, the selective attention of media to personal interest stories and the focus on tabloid-style journalism of traditional media can be a hindrance rather than a help for the plans of disaster management. In this context the informed use of new media technologies by disaster agencies may balance the traditional media's shortcomings. For example, disaster agencies can use their internet sites to bypass the media's gate keeping process and to have a direct communication link with the public.

Concerning the second aspect, one needs to understand that in disaster situations the public's information needs and information seeking behaviour differ considerably from routine media

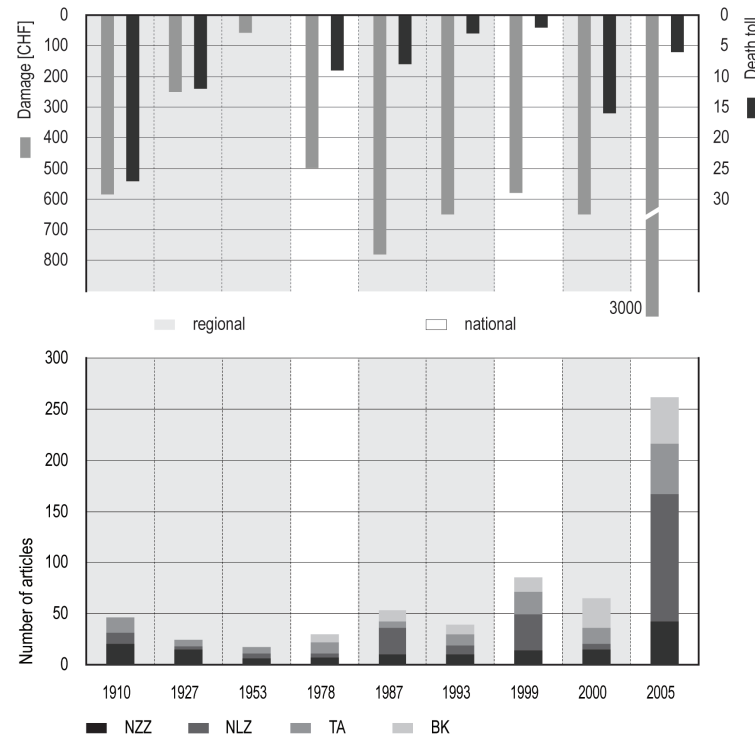
choices. This is due to the high level of uncertainty and the perceived threat. At the same time, digital communication technologies enable the establishment of an increasing number of communication channels. Everyday media usage becomes more and more fragmented. Likewise in crisis situation; the public has many options to fulfil its information needs about a disaster. From the perspective of disaster agency, the availability of differentiated media channels and the destabilisation of traditional usage habits complicate the communication of urgent and coherent messages to the public (Liebes, 2005). In this context, disaster agencies need to be well-informed about the public's usage of available communication channels in a crisis situation to strategically plan their information policy.

This is especially important if relatively new communication channels are employed. Literature shows that in the realm of disaster communication strategies proposed ICT solutions often fail to consider the public's information behaviour (Carey, 2003; Crowe, 2008). Although thousands of disaster organisations have created WWW homepages, they do not necessarily reach a critical mass; new technologies by themselves will not result in getting information to everybody (Morris & Ogan, 1996; Neumann, 2002). Also, the majority of emergency management websites lack usability when addressing the general public (Crowe, 2008). Finally, it is necessary to be aware that potential receivers have individual characteristics, varying information needs and information seeking behaviour. These factors are important determinants of message effectiveness (Seeger, 2008).

In the following paragraphs we will present a case study on floods in Switzerland to illustrate the changing disaster coverage of traditional media and the public's information seeking behaviour. The data will give us the opportunity to point the media's production logic and shortcomings. Based on our research results, as well as on literature we



Figure 1. Damages (CHF); death toll and comparison of no. of newspaper articles spanning nine flood events, 1910 to 2005 in Switzerland.



will discuss the advantages and disadvantages of ICT in the context of disaster communication.

## CASE STUDY: INFORMATION ACQUISITION, PERCEPTION OF RISK AND PRESS COVERAGE OF FLOODS IN SWITZERLAND

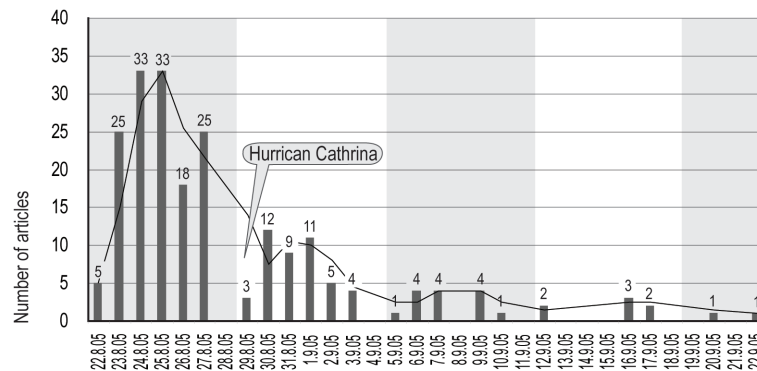
### Data Basis

Natural disasters, such as floods, represent one of the most hazardous environmental risks of our time. Like many other highly developed nations, Switzerland has been affected by flooding events fairly frequently since the 1970s and is exposed to a high hydro-geological risk level.

The case study is based on two different data sets. The first data set is a content analysis of the media coverage of floods in Switzerland

from 1910 until 2005. The nine analysed floods were selected based on having been determined as highly catastrophic by natural scientists. The major criterion for this assessment is widespread geographic damage with costs exceeding 100 million CHF (see figure 2). Four major newspapers were analysed: Neue Zürcher Zeitung (NZZ), Tages-Anzeiger (TA), Neue Luzerner Zeitung (NLZ). Additionally, the tabloid newspaper Blick (BK) was analysed, but could only be included in the sample after its establishment in 1959. This longitudinal study provides an opportunity to trace and analyse changes in the media system, the conditions under which disaster management works, and the resulting press coverage. The second data set consists of a large telephone survey conducted in 2007. It focuses on a major flood in 2005 and covers issues concerning information sources, perception of the risk and preventative actions taken by the public. The representative

Figure 2. Diffusion of news about the August flood 2005 in Swiss dailies within one month.



sample consisted of 2063 participants, ranked with respect to age (15-95) and gender for each of the 26 Swiss cantons.

## MEDIA COVERAGE OF DISASTERS

Figure 1 gives a quantitative overview of the extent of flood coverage represented in the number of articles, and the financial impact and loss of life.

Considering all newspapers, the data shows a clear increase over the analysed time period. The later trend becomes clear: flood disasters since the 1970s attract more media attention, although with scale-related fluctuations. Media attention started to rise considerably in 1978 and reached its peak in 2005, the year of the most costly flood, which caused damages of 3 billion Swiss Francs and six fatalities. In comparison with similar catastrophes during the last 100 years, the number of articles exceeded previous coverage by a long margin. It is noteworthy that the level of coverage does not correspond with the salience of an event attributed by experts. Climate scientists view of the floods of 1910 (damages: 584 mio. Swiss Francs; death toll: 27) and 1999 (damages: 580 mio. Swiss Francs; death toll: 2) as equivalent events, however nearly twice as many articles appeared in 1999. Further, the disaster in 2000 caused damages of 650 million Swiss Francs and the highest death

toll in recent times (16), yet reached scarcely a quarter (23.5%) of the 2005 coverage.

If we focus on the level of reporting by individual newspapers, data suggests that the enormous expansion of news reporting in the 2005 flood is accompanied by a substantial rise in article production in all four newspapers. These findings indicate that the amount of reporting is not necessarily an objective representation of the real situation. The so-called elitist paper *Neue Zürcher Zeitung* is an exception; its coverage has been more or less consistent with experts' assessment of the gravity of the floods over the last 100 years. In contrast to this, the other dailies tend to generally increase coverage, especially the *Neue Luzerner Zeitung*.

Figure 2 shows the quantity of press coverage of the 2005 flood during the month of occurrence

Around 80% of the total press coverage of the flood occurred within this month. Media attention was highest in the first week, and attention reached its peak on the third and fourth day of the flood. More than 60% of all articles about the flooding were produced in the first week. After this initial attention the media coverage continuously decreased. The relatively rapid fall of news coverage may have been due to Hurricane Katrina in New Orleans. So-called 'killer issues' can sweep a news event very quickly from the headlines. There appears to be a disaster coverage rule: "A rare hazard is more newsworthy than a common

*Table 1. Framing structure: disaster reporting of three time periods*

<b>Framing structures in disaster coverage</b>	<b>1910-1953</b>	<b>1978-1999</b>	<b>2000-2005</b>
General description of event	<b>19.1%</b>	<b>16%</b>	<b>12.6%</b>
Safety/ Rescue operations/ Resettling	<b>13.8%</b>	<b>8.8%</b>	7.2%
Affected people/ Official impact report	<b>13.2%</b>	4%	3.8%
Political reactions/ Consequences/ Laws	<b>12.6%</b>	<b>11.7%</b>	<b>8.6%</b>
Private aid/ Organised solidarity	<b>7.8%</b>	4.5%	2.1%
Economy/ Employment	6.6%	8.5%	7.3%
Human Interest	6.6%	<b>11.9%</b>	<b>15.6%</b>
Science/ Technology	4.8%	<b>9.7%</b>	5.6%
Nature/ Environmental problems	3.0%	4.5%	4.5%
Damage/ Consequences	2.4%	7.2%	<b>11.6%</b>
Insurance/ Compensation	2.4%	1.7%	2.5%
Religion/ Church	2.4%	0.5%	0.5%
Retrospect/ History	1.8%	1.8%	2.9%
Entertainment/ VIPs/ Culture	1.8%	2.2%	2.1%
Future expectations	1.2%	4.5%	<b>8.7%</b>
Other topics	0.5%	2.7%	1.40%
Total n* (1197)	<b>100% (167)</b>	<b>100% (401)</b>	<b>100% (629)</b>
Frequency of issues (%); *An article may have up to 2 main issues			

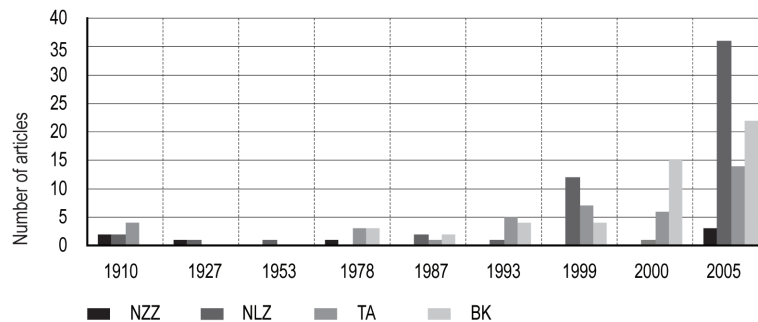
one (...); a new hazard is more newsworthy than an old one; and a dramatic hazard – one that kills many people at once, suddenly or mysteriously – is more newsworthy than a long-familiar illness” (Singer & Endreny, 1987, p. 13). As a result of event-focused rather than process-focused orientated disaster reporting, audiences tend not to be able to find complex information about the disaster or the response activities at the regional, national or international level. Nor do they have access to analyses by scientists, insurance companies or affected people beyond the superficial.

In a historical perspective we are able to identify three different periods of disaster coverage as regards the story focus. Table 1 represents the issues and their importance during the different phases.

The first period covers the time from 1910 until 1953. Against the background of a public service oriented media system, press coverage

mainly focused on a general description of events (19.1%). Other important issues were public safety, rescue operations and resettlement (13.8%), official reports on people affected (13.2%), as well as consequences and implications for policy (12.6%). Also organised solidarity and private aid is newsworthy (7.8%). In summary, the main focus of disaster coverage during the first half of the century is shaped by social issues. The second period covers the floods from 1978 to 1999. During this time there was growing concern about environmental problems, technological risks, as well as concerns about the future. In the press, coverage of science and technology (9.7%) and issues concerning the scale of loss (7.2%) become important issues. Risk scenarios and risk calculations gained 4.5% of coverage. In addition, human interest stories provided subjective views on the personal lives of victims (11.9%). The third period from 2000 – 2005 is characterised by an

Figure 3. Disaster visualisation from 1910-2005: A comparison of picture area



intensified reporting on human interest issues (15.6%). These stories do not illustrate concerns of the general public or have political relevance, but highly individual and private tragedies, focus on sensationalist storytelling and have a ‘touchy-feely’ tone to the writing. This is in line with the focus on damages (11.6%).

There is a certain trend that can be observed over time. The general description of events and the political reactions are important topics in all phases, but their share of coverage is decreasing over time. The focus of coverage shifts towards human interest stories, which rise to almost 16% of coverage in the 2000-2005 period. Such stories are marginal in the earlier coverage produced during the period of political press and public service oriented journalism. This development indicates the increasing market and reader driven approach in the production of news using a sensational-

ist and voyeuristic point of view. Damage and consequences as well as future expectations also increasingly shape the mediated representation of disaster reporting.

Figure 3 shows the amount of human interest stories in the different newspapers over time.

It becomes clear that all newspapers are increasingly using this frame in their reporting. Only the Neue Zürcher Zeitung (NZZ) seems to be an exception. This paper adheres to the established editorial position among broadsheet papers to respect the private sphere of victims; until 2005 it does not report human interest stories at all. This is in sharp contrast to the development of their other so-called quality papers: Neue Luzerne Zeitung (NLZ) and Tages-Anzeiger (TA). The dissolution of differences between the tabloid and quality press also affects Blick (BK), the only

Figure 4. Human interest stories in disaster coverage 1910-2005

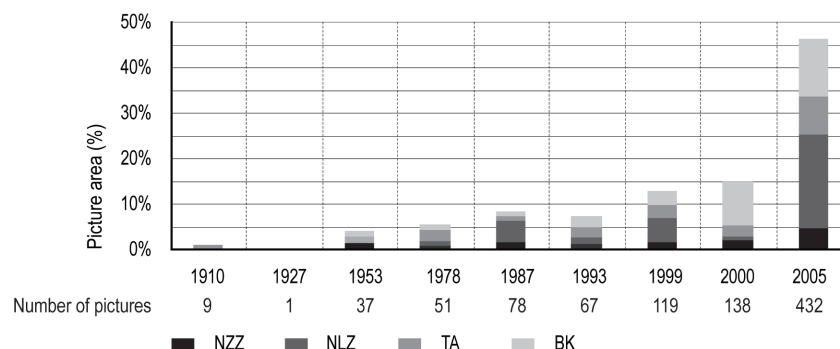
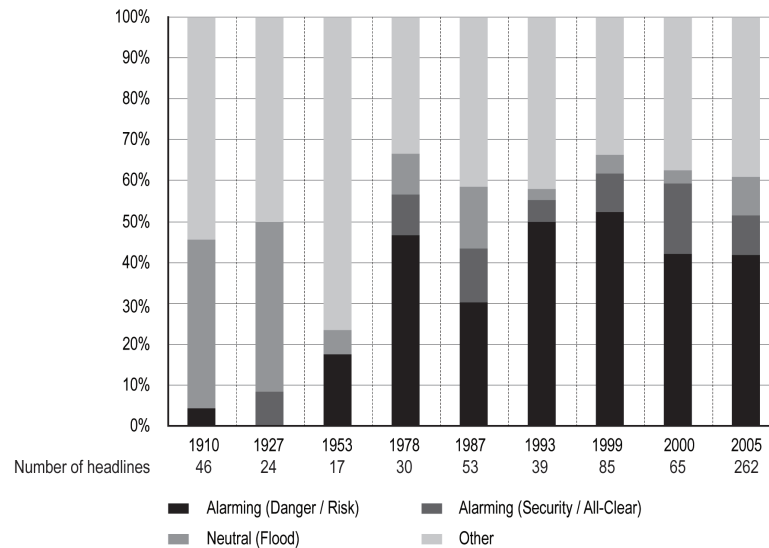


Figure 5. Neutral, alarming vs. reassuring tone in disaster reporting headlines



true tabloid paper to also increase its amount of human interest stories.

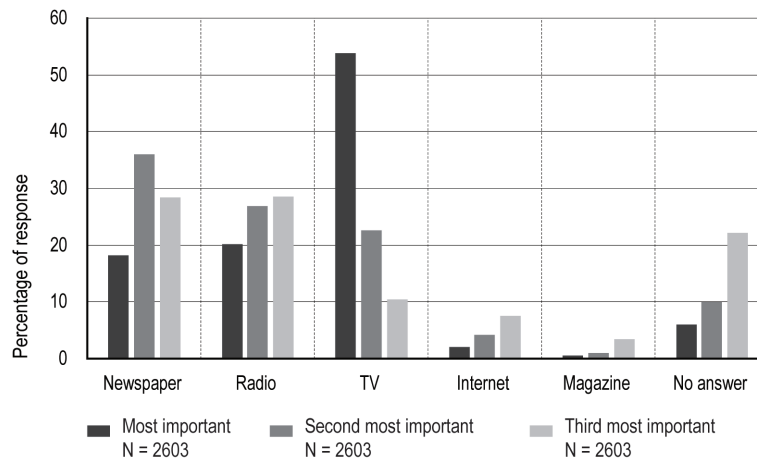
The number of pictures and the space occupied by visualisations has increased from event to event and reached a peak in 2005: Over 46% of the picture area was devoted to coverage of the 2005 flood. This triples the visual information on the flood in 2000 and is 46 times the space taken in 1910. Newspapers have moved away from the written to the visual. On one hand, this is due to ever improving technical possibilities. On the other, this reflects the changing style of journalism. Visuals have become prevalent in all of today's media presentation: Editors look for expressive images, particularly those that prompt and touch emotions. One points out: "I look at visuals. I look at interests" (McManus, 1994, p. 132). It has been shown that pictures evoking emotions can impact risk estimation of flood disasters (Keller, Siegrist & Gutscher, 2006). While the trend towards highly visual reporting is evident, the change of picture content is less obvious. There is a trend away from photographs of objects to that of people, in particular affected people in personal circumstances. This parallels

the trend in human interest stories in all aspects of journalism. Figure 5 illustrates the tone of headlines in the flood coverage over time.

The drama in 2005 is expressed in headlines and alarming tones, compared to the more neutral language in the first half of the 20th century. The flood of 1978 signalled a change in rhetoric, nearly half of the headlines alluded to risk or danger. This trend in dramatic headlines has persisted since then, but with even higher percentages in the 1990s than 2000 or 2005. Headlines using a reassuring tonality are less attractive to the editors, as they may not attract the audience's attention, as well as dramatic headlines, such as "Switzerland submerged!" Of course, we cannot simply assert that changing mass-media norms constitute the only reason for these changes. News media also reflects changes in society as a whole. Information sources may also have taken more alarming tones with regard to hazards.

The results presented on the increasing use of human interest stories, visualisations and dramatised headlines underline the interpretation that there is a trend toward the tabloidization of disaster coverage. This trend has the potential to

Figure 6. Use of news media in the August flood 2005: A comparison of importance



produce unwanted side-effects with regard to how affected people might react prior to, during and after emergencies. Those involved with disaster planning and management need to be aware of these intervening factors and plan communications accordingly. Tabloidisation can cause disproportionate and unbalanced reporting and leads to inaccurate interpretations of events by readers. The reality of disasters becomes distorted by the verbal and visual pictures presented in the media in appeals for money based on emotions and fear. Furthermore, prior coverage of disasters creates pre-conditions affecting the ways in which disasters get perceived and covered. These factors are compounded by the pressures faced by journalists in the context of market competition.

### Information Seeking Behaviour and Media use in Disaster Situations

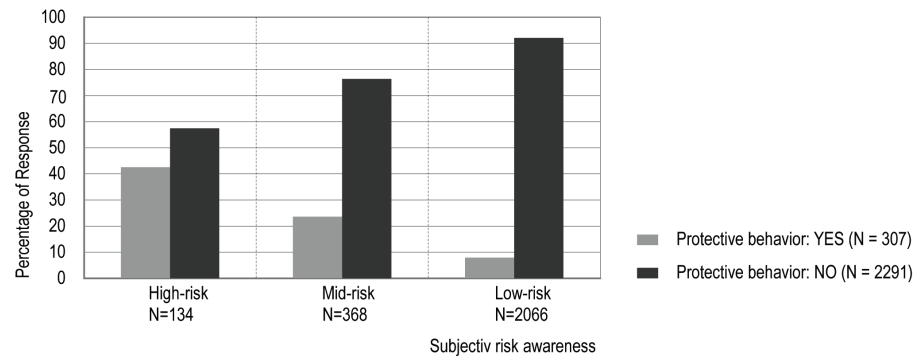
In the case of calamities, the public becomes dependent on the media for important information from public authorities and news. This information may be vital for survival. Also, active information seeking by the audience is increasing. This is supported by our study: Nearly a third of the respondents (30%) reported an increase in media consumption during disaster periods.

The respondents demonstrate pervasive access to different news media during the crisis (see Figure 6).

Television is the primary source of information. More than half of all respondents (53%) first turned to TV, followed by radio (20%) and then to newspapers (18%). In contrast, the internet was not used frequently as a primary source of information. Only about 2 percent considered this new channel of information as the most important during the crisis situation. Although the percentages rise slightly as the second or third most important sources of information, the internet's general influence as an information source during a crisis is marginal. This is coherent with the findings of other analyses (Rogers, 2003; Cohen, Ball-Rockeach, Jung & Kim, 2003; Bucher, 2003).

The population has specific information needs during a crisis. At the top of the list is the desire for expert knowledge and opinion regarding causes and consequences of a flood (48.7%). This is followed by information on how the community is coping with the crisis and political crisis intervention (28.7%). Next comes information about rescue operations and official help (26.9%), followed by advice on what to do (24.3%) and interest in individual stories of victims (24%). The least important information is on donations

Figure 7. Percentage of response to risk awareness and adoption of protective behaviour



and other assistance (17.3%). Despite this stated public interest, looking at the press coverage of the floods from 2000 to 2005, only one in twenty articles included particularised expert knowledge and information on causes (see Table 1, frame science/technology). Interestingly, the respondents express relatively little interest for information about life support and advice on actions to be taken by potential victims. These are only two examples of the disparity between audience interest, actual coverage, and the goals of disaster agencies.

### Risk Perception and Protective Behaviour

Most people know that floods can generally result in serious damage to environment, property and people. However, the perceived personal possibility of being affected by a flood the findings from the survey are sobering. Only a small number of respondents envisaged a high personal risk (5%). Most people (81%) classified their personal situation as low risk concerning flood damage. As expected, the less the perceived risk is the less preventative or protective action gets taken (see Figure 7).

Safety beliefs did have a cross-linked influence on safety behaviour. Nevertheless, most people perceiving a high level of personal risk stated that they had not implemented any kind of precautionary measure (57%).

Numerous studies point out that people without flood experience can not envisage the negative effects of severe damage due to floods (Lowenstein, 1996; Siegrist & Gutscher, 2006; 2008; Miceli, Sotgiu & Settanni, 2008). Fear and helplessness as consequences are particularly strongly underestimated. Not surprisingly, in this group most people did not take preventive actions in case of a flood situation (93%). People who had previous flood experience did take such measures more often; still the small percentage in this group (22%) is surprising. Consequently, past negative experience is not a sufficient indicator for future preparation. Siegrist & Gutscher (2006) assume that reasons for not taking preventive action in spite of personal affectedness are the high costs of measures or knowledge gaps about possible measures.

### IMPLICATIONS OF THE CASE STUDY FOR DISASTER COMMUNICATION AND THE USE OF ICT

The case study shows that traditional mass media still play a major role in people's information seeking behaviour in times of crisis. In recent years, rapid changes in mass media structures coupled with new communication technologies have promoted a shift in disaster communica-



tions. The analysis indicates that journalism has moved away from public service orientated goals towards the imperative of market logic. Most coverage by the newspapers are extending their focus on human-interest stories, highlighting the personalities of victims combined with ever larger visuals/photographs. Dramatic elements appear as necessary elements in response to the pressures of the media business. The selective processes (and arbitrary decisions on whether or not to cover the big story within the media) prompted by business logic leave out important elements of disaster processes which can have far-reaching serious consequences for disaster management agencies and citizens. One example from our case study is the low perceived risk of the public: Despite the general increase in media coverage on floods the people seem to trivialise the actual risk. This may due to the media's trend towards short-lived human interest stories using tabloid styles of presentation.

In accordance with the findings, we need to consider ICTs as effective tools for disaster agencies to raise and strengthen risk perception, as well as self-protection measures. ICTs facilitate access to official disaster information in times of emergency and have advantages over traditional media for disaster communication agencies. First, information provided by the disaster agency directly and via ICT is independent of the gate-keeping process by classical media outlets. ICTs offer disaster agencies the opportunity to create their own web pages, to constantly update information beyond space and time limitations, and address audiences directly. Disaster agencies can transmit relevant content rapidly, provide content in different languages, and use different forms of presentation. Information on this basis may be more authentic than that processed through the media system and the content can include detailed information of local, national and international services. According to Nudell & Antokol (1988) in crisis situations "it is always the best if the information comes from you!" (p. 68), i.e.,

from disaster managers or designated spokes-people. Second, new technologies offer unique information and communication opportunities. The traditional one-to-many communication without feedback provisions and the hierarchical relationship between media communicators and audiences are replaced by bi-directional or multi-directional communication (Geser, 1997). New media enable users to set up personal preferences for the kind of information they want to receive. For disaster management, personalised forms of information before, during or after an event offer useful applications. In particular, individualised information about the necessary behaviour in the case of a disaster must be emphasised (Winerman, 2009). Additionally, people will no longer be just passive audiences, as web-based software supports interactive tools. People are able to report incidents, post messages and start discussions (Morris & Ogan, 1996; Geser, 2002). Third, the archive function of ICT presents an advantage for disaster communication. After initial publication on the internet, digitalised information is available for days, weeks or even months. In addition, the electronic mode of communication results in abundant information in all domains of disaster and risk knowledge.

There are many opportunities through ICT. However, if we only focus on technological solutions within the field of computer-mediated communication and neglect the audiences' information needs and media usage habits, we ignore limitations in disaster communication. First, it is important to note that new media are only one element alongside many in peoples' daily lives and media choices (Carey, 2003). From the case study it is apparent that the internet is not considered a very important communication channel in the disaster information seeking processes. In a crisis situation people still remain highly dependent upon traditional mass media. Accordingly, there is a need to critically assess statements overestimating the importance of web-based communication in situations of crisis (Arellano, 2008). Neverthe-

less, many governmental disaster agencies have created web-based services and their remains a gap between availability and actual use. For the effective use of ICT communication the question 'How to lead people to specific web portals?' is of primary importance. Second, ICT and related information sources often lack credibility. Media research suggests the perceived source-credibility, rather than the actual information conveyed, is important for information processing of the audience (Kaufman, Stasson & Hart, 1999). ICT and the surplus of available information place the burden to determine the trustworthiness of sources and news on the user (Morris & Ogan, 1996). In situations of extreme urgency and danger, it is not surprising people still choose traditional media channels or the online version of established media brands where the perceived credibility is high (Bucher, 2003; Winerman, 2009). Third, there may be sources that spread inaccurate or even false information, prior to official assessments. Winerman (2009) points out that the increasing use of social network sites for information seeking can be problematic. Social Network communication may bypass official information. This can lead to rumours and 'wrong' headlines being circulated literally around the world. False information can have side-effects, such as distorted perceptions of the crisis, disproportional fear or reputation losses of crisis management in the affected country. In this context it is of extreme importance for disaster communication to differentiate between official information provided by disaster agencies and unofficial 'rumours going around the internet'. This may establish trust in their online communication and overcome the public's resentment against this form of communication. Fourth, ICT raises questions concerning issues of access, exclusion and participation. Although the spread of ICT is ongoing, social and economic differences, as well as unequal distribution of infrastructure, determine unequal access to new communication technology. These differences need to be accounted for and dealt with by disaster management agencies.

For disaster communication an approach which recognises that both, traditional media and ICT, and takes into account varied user styles is important. This includes recognising both the capacities and limits of ICT. However, recent research results point out that professional emergency managers are not knowledgeable regarding the way in which the public uses media during disasters or how to utilise web-based services as an effective tool for communication (Carey, 2003; Arellano, 2008). Good communication in a disaster is much more than posting information on the internet and working with news organisations. An analysis of several factors is necessary in order to produce effective communication systems and to deal with the unwanted side effects of media logic. These include the promotion of emergency management websites as accessible and credible tools providing safety-related information, the enhancement of their usability, and training and advice on how to use these services. These services need to be put into the context of the affected communities and their information seeking abilities, styles and preferences. Disaster communication via ICT should include not only information leading up to and during emergencies, but also in the aftermath of events.

## **THE NEED FOR FURTHER RESEARCH**

Effective disaster risk management depends on risk awareness, good governance, proper technical and communication infrastructure adapted to information needs, and the empowerment of all those who are at risk. Learning how to prepare and take appropriate action without firsthand experience of catastrophes is a big challenge. In this sense, no single medium meets all the communication needs of both disaster managers and the public. The overall goal of risk reduction is influenced by how experts and practitioners handle information in the course of managing disasters.

For this purpose they need special knowledge which must be delivered by scientific research.

Only systematic, country specific and comparative research, accounting for traditional and new media, media audiences as active participants and knowledge of the unintended effects of media reporting will help us to identify and understand the potential offered by ICTs in disaster situations. Furthermore, it is important to take into account not only different geographical areas, between and within countries, but also variables such as age, gender, class, ethnicity, literacy etc. This requires studies at the micro-level in order to produce data that is relevant to a range of media user contexts. Moreover, disaster and communication research must continue to evolve in an integrated fashion. Thus, any discussion of state-of-the-art technologies and methods must ultimately be cast in terms of how they relate to the conditions of the media system as well as the needs of the general public and affected people.

Disaster coverage, the public's information habits and the rapidly changing media environment (with all its technological possibilities) need to be continuously monitored in order to strategically plan and effectively adapt disaster management and communication. ICT may give disaster management a lot of opportunities and enormous resources for crisis communication. However, this success will not be attained simply because of the availability of these channels or the multifaceted functions of ICT. Success will depend more on the form of use and basic principles like audience access, usability, trust and reliability are key elements in order to achieve the potential of these channels in assisting affected people or the general public.

## **CONCLUSION**

To reach its goal disaster management needs to take into account the divergence between media

coverage, audience interests, and information necessary for public safety. The mass media have their own logic; they foremost address the general public, not only people directly affected by the disaster, and want to attract audiences for advertisers. This may lead to coverage of disasters that is not necessary aligned with the interests of disaster agencies and the general goal to reduce risk. Perhaps the use of ICT technologies, and especially the internet, can compensate for the mass media's shortcomings. On the one hand, direct ICT communication by disaster agencies can bypass the traditional media and journalistic production logics that may be a hindrance to effective communication. New electronic networks allow alternative structures, which work quite differently to the one-to-many nature of traditional mass media system and allow disaster agencies to spread specific information to the affected people. On the other, the reach of new media technologies and the use of these channels by the general and affected public in disaster situations seem to be the greatest obstacles of such communication strategies. Traditional media still are the most used and most trusted information sources in a crisis.

Disaster prevention agencies must take these factors into account when planning their communication strategies. Concerning the different stages of communication, ICT may be of specific use in the pre-event communication to raise public awareness about risks and motivate mitigating behaviour. As suggest by the case study the low perceived risk by people who are under threat by future floods seems to be related to existing knowledge-gaps about actual risks and this, in turn, might be affected not only but also by the tabloidization of media coverage. Technical advancements and ICT can provide the disaster agencies with the power to take necessary steps to improve risk awareness by the public and motivate individuals to engage in preventative behaviour though improved information. This can happen by way of providing valuable information, establishing spe-

cial forums or online communities where experts share their own experiences with floods, but also through playful interactions, free online learning programmes for children as well as for adults etc. The possibility of interactive elements offers many opportunities for disaster communication, such as the integration of information provided by lay people or the direct reaction to public concerns. However, risk communication must not focus solely on pre-event information and early warning technology. Trustworthy and reliable information is crucial in disaster situations. Here the internet may have limitations as it offers a multitude of different information, perception and judgments and is as yet not regarded as a generally credible information source by the public. In order to make informed choices between media sources, media and information literacy skills are required and the internet services of official actors need to be promoted more widely to the public.

Generally, agencies need to attend to the specific user habits, differences of tradition, culture and access, as well as media regulations so that communication can be effective. Developing capabilities to reach the majority of the population in a timely way and with the right information before, during, and in the aftermath of disaster, is in itself a challenge. The constantly changing media environment, the new possibilities and challenges of ICT, and the changing journalistic routines add increasing demands on disaster agencies. Handling these challenges is the key to future successes in risk reduction. Web-based technologies must therefore be understood within the broader social context of how they function in everyday life. It is hoped that this chapter will be helpful in prompting further research in this field, highlighting the practical implications, and most of all that this will be useful in generating further interest in this fascinating and important field.

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## ENDNOTES

- <sup>1</sup> Though the term Information and Communication Technology may encompass both traditional electronic media and so-called new media we will concentrate on opportunities arising by the internet.
- <sup>2</sup> The study was financed by the Swiss Government; “Flood 2005 in the memory of Swiss” in 2007.